Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022

Original research article

A Comparative Study on Dynamic vs. Static External Fixators in Juxta Articular Phalanx Fractures

[1]Dr. Bhavya R Sheth, [2]Dr. Akhil Bansal, [3]Dr. Shripal Doshi, [4]Dr. Sudhir K Rawat, [5]Dr. Vinod Kumar C

[1, 2, 3rd] Year Resident, Department of Orthopaedics, Dhiraj Hospital, SBKS MIRC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat, India

[3] Senior Resident, Department of Orthopaedics, Dhiraj Hospital, SBKS MIRC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat, India

[4] Associate Professor, HOU Department of Orthopaedics, Dhiraj Hospital, SBKS MIRC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat, India

[5] Assistant Professor, Department of Orthopaedics, Dhiraj Hospital, SBKS MIRC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat, India

Corresponding Author:
Dr. Sudhir K Rawat (sudheerkrawat11@gmail.com)

Abstract

Fracture of phalanges are more common in hand than in foot and accounts for 10% of total upper extremity fractures. Most common mode of injury includes road traffic accidents, industrial accidents and Domestic/trivial trauma. The distal phalanx and border digits are most commonly injured. Males are more affected than females. The most common finger injured is the small finger. The aim of surgical intervention in these cases involve restoration of articular congruity, length and correction of rotational deformity, anatomic realignment, fracture stability, and early range of motion. Improper treatment can lead to malunion resulting in deformity or loss of function as well as joint stiffness. Here we compare the efficacy and outcome of two types of external fixator which is used for phalangeal fracture reduction: static and dynamic.

Keywords: External fixation, fracture phalanx, static, dynamic

Introduction

Fractures of phalanges are more common in the hand and accounts for 10% total upper extremity fractures [1]. Incidence of Phalangeal fracture is 2.9% every year worldwide [2]. It is more common in young to middle aged males. Most common mode of injury includes road traffic accidents, industrial accidents and Domestic/trivial trauma. Phalangeal fractures with unacceptable angulation and rotation deformity in any plane require operative Fixation [3]. Candidates for operative interventions include patients with open fractures, intra-articular fractures and patients with unstable fracture patterns. The aim of surgical intervention in these cases involve restoration of articular congruity, length and correction of rotational deformity. Here we compare the efficacy and outcome of two types of external fixator which is used for phalangeal fracture reduction: static and dynamic.

Methodology

This is a prospective interventional study conducted in Dept. of orthopaedics at Dhiraj hospital between the year June 2021 to June 2022. Our study included 18 patients with juxta-articular phalanx fractures presented to the casualty and OPD who met the inclusion criteria. 9 patients were treated with static external fixators and 9 patients were treated with dynamic fixators. After regional anaesthesia, mostly ring block, fracture of respective phalanx is assessed and reduction achieved by manipulation with aid of image intensifier. In case of any open wound we administered thorough wound wash and initial debridement with proper assessment for any tendon and vascular injury prior to fixation. Reduction was held and maintained by insertion of 2 pins. Pins were passed in safe zone to avoid tendon or ligament entrapment or neurovascular damage. Both static and dynamic external fixators are joint spanning fixators, but dynamic fixator has an advantage of mobilization at the joint being spanned. Sterile dressings are placed over the finger and around pin sites. Pointed end of pins and rod covered with adhesive bandage to avoid injury. External fixator care explained to the patients. All patients were reviewed every 2 weeks for the first 1 month. Repeat radiographs were taken at 4 weeks to look for fracture healing. Then the external fixator was removed and monthly follow up with active physiotherapy done for next 6 months. Range of movements noted on every visit. Passive mobilization were encouraged following surgery to avoid contractures in both set of patients.

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022

Discussion

The criteria used for assessing the progress was BELSKY'S TAM criteria. All of the 18 patients were followed up on a two weekly basis for the first month and a monthly basis for the next six months. The results were noted and matched with criteria as follows:

Table 1: Belsky's Criteria [4]

Criteria	TAM Score	Results
Pain-Free, Union, No Deformity	>215	Excellent
Pain-Free, Union, Minimal Deformity	>180	Good
Pain or Non-Union Deformity Affecting Function or Cosmesis	<180	Poor

Table 2: Results of Dynamic External Fixator According to Belsky's Criteria

Results	Total No. of patients	Percentage
Excellent	3	33.33
Good	5	55.56
Poor	1	11.11
Total	9	100

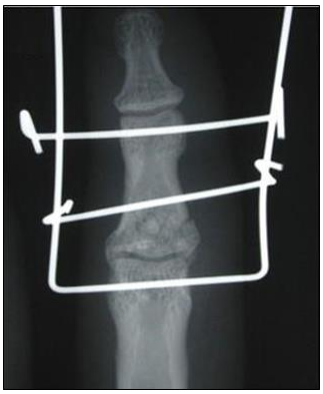
Table 3: Results of Static External Fixator ACC. to Belsky's Criteria

Results	Total No. of patients	Percentage
Excellent	1	11.12
Good	4	44.44
Poor	4	44.44
Total	9	100

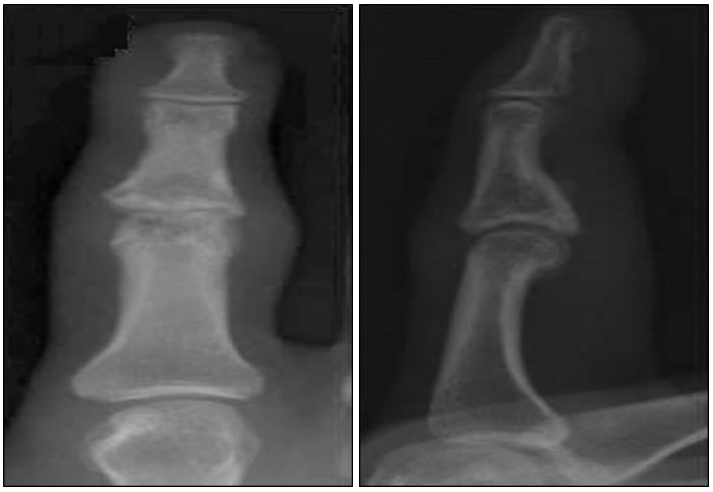
Fracture of phalanges are usually common and minor injuries and are often left unattended[5]. Most of phalangeal fractures are treated conservatively, but some form of fixation is indicated in unstable fracture pattern, Comminuted fractures, intra-articular fractures and open fractures. Open reduction and internal fixation may not be suitable in articular comminuted fractures due to size of fragments and it is not ideal when there is risk of infection due to open wound. External fixation remains an important treatment modality in such cases. In our study, 9 patients who were treated with dynamic external fixator, 3 produced excellent results (33.33%), 5 patients had good results (55.56%), and 1 with poor results (11.11%). Similarly other 9 patients who treated with static external fixator, 1 produced excellent results (11.12%), 4 had good results (44.44%) and 4 achieved poor results (44.44%). A study by Ricardo monreal in 2017 for phalangeal fracture reduction with dynamic external fixator with 12 patients showed 3 with excellent results (25%), 8 were good results (66.6%), 1 achieved poor results (8.3%). The results of Ricardo is in similar manner with our study. This shows the advantage of dynamic external fixation over static external fixation. Phalanx fracture mostly starts union by 3 to 4 weeks. But immobilization of joint with static external fixator has a some limitations or disadvantages like joint stiffness, soft tissue contracture, loss of fine movements. These disadvantages affects the daily activities of living to those patients. But by dynamic external fixator, we can reduce the incidence of contractures and joint stiffness to some extent by keeping the movements of joint intact.

Picture 1: Pre-Op X-ray

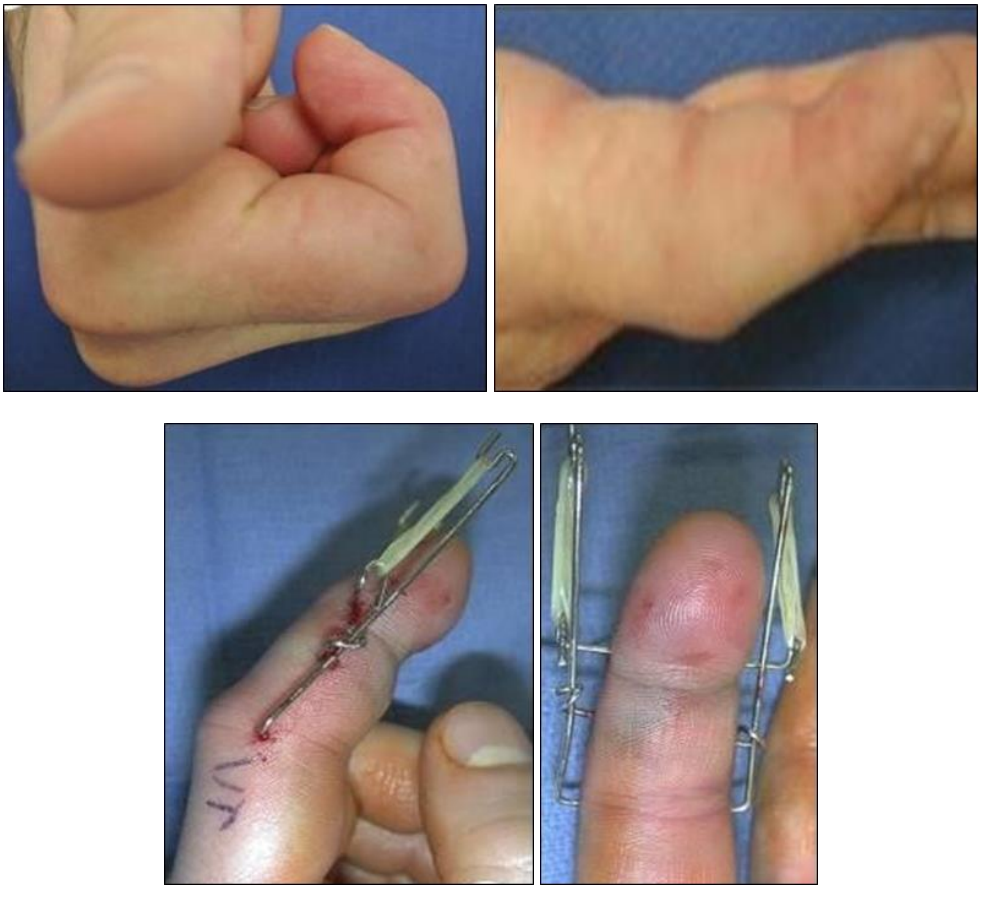
ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022



Picture 2: Post-Op X-Ray



Picture 3: X-Ray at Final Follow-Up



Picture 4: Clinical Photos

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 08, 2022

Conclusion

We conclude that both static and dynamic external fixation does achieve good fracture reduction yet some disadvantages of static fixator which could be avoided by using dynamic external fixator which produce better functional outcome.

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